

PCT

WORLD INTELLECTUAL PROPERTY ORGANIZATION  
International Bureau



INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification <sup>7</sup> : A23L 1/30	A1	(11) International Publication Number: WO 00/64282 (43) International Publication Date: 2 November 2000 (02.11.00)
<p>(21) International Application Number: PCT/IT00/00163</p> <p>(22) International Filing Date: 27 April 2000 (27.04.00)</p> <p>(30) Priority Data: RM99A000260 27 April 1999 (27.04.99) IT RM99A000646 21 October 1999 (21.10.99) IT</p> <p>(71)(72) Applicants and Inventors: TORTORA, Diomede, Antonio [IT/IT]; Via Acicastello, 32, I-95126 Catania (IT). CORRADINI, Claudio [IT/IT]; Via S. Giovanna Elisabetta, 24, I-00189 Roma (IT). DUGO, Giovanni [IT/IT]; Via Lago di Ganzirri, I-90100 Ganzirri (IT).</p>		<p>(81) Designated States: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).</p> <p>Published <i>With international search report. Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments. In English translation (filed in Italian).</i></p>
<p>(54) Title: NUTRACEUTICALS AND INGREDIENTS FOR FUNCTIONAL FOODS</p> <p>(57) Abstract</p> <p>The present invention provides functional food products which can be used as nutraceuticals as well as ingredients for functionalised foods. All the proposed formulations provide nutraceuticals and food products comprising ingredients such as flavonoids, antocyanins, resveratrol, all from natural origin, which are co-spray dried using fructans or fructooligosaccharides instead of maltodextrins as a drying agent. Furthermore, the proposed functional food preparations obtained by spray-dry technique, using fructans of inuline-type, are particularly suitable to form a gel or cream, showing a fat-like texture.</p> <div style="text-align: right; margin-top: 20px;"><p>ATTORNEY DOCKET NUMBER: 11592-006-999 SERIAL NUMBER: 10/088,664 REFERENCE: B26</p></div>		

BEST AVAILABLE COPY

**FOR THE PURPOSES OF INFORMATION ONLY**

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AL	Albania	ES	Spain	LS	Lesotho	SI	Slovenia
AM	Armenia	FI	Finland	LT	Lithuania	SK	Slovakia
AT	Austria	FR	France	LU	Luxembourg	SN	Senegal
AU	Australia	GA	Gabon	LV	Latvia	SZ	Swaziland
AZ	Azerbaijan	GB	United Kingdom	MC	Monaco	TD	Chad
BA	Bosnia and Herzegovina	GE	Georgia	MD	Republic of Moldova	TG	Togo
BB	Barbados	GH	Ghana	MG	Madagascar	TJ	Tajikistan
BE	Belgium	GN	Guinea	MK	The former Yugoslav Republic of Macedonia	TM	Turkmenistan
BF	Burkina Faso	GR	Greece	ML	Mali	TR	Turkey
BG	Bulgaria	HU	Hungary	MN	Mongolia	TT	Trinidad and Tobago
BJ	Benin	IE	Ireland	MR	Mauritania	UA	Ukraine
BR	Brazil	IL	Israel	MW	Malawi	UG	Uganda
BY	Belarus	IS	Iceland	MX	Mexico	US	United States of America
CA	Canada	IT	Italy	NE	Niger	UZ	Uzbekistan
CF	Central African Republic	JP	Japan	NL	Netherlands	VN	Viet Nam
CG	Congo	KE	Kenya	NO	Norway	YU	Yugoslavia
CH	Switzerland	KG	Kyrgyzstan	NZ	New Zealand	ZW	Zimbabwe
CI	Côte d'Ivoire	KP	Democratic People's Republic of Korea	PL	Poland		
CM	Cameroon	KR	Republic of Korea	PT	Portugal		
CN	China	KZ	Kazakhstan	RO	Romania		
CU	Cuba	LC	Saint Lucia	RU	Russian Federation		
CZ	Czech Republic	LI	Liechtenstein	SD	Sudan		
DE	Germany	LK	Sri Lanka	SE	Sweden		
DK	Denmark	LR	Liberia	SG	Singapore		
EE	Estonia						

## NUTRACEUTICALS AND INGREDIENTS FOR FUNCTIONAL FOODS

The main aim of the present invention is to provide nutraceuticals and food products comprising fructans and fructooligosaccharides (FOS) and nutraceutical ingredients  
5 such as flavonoids, antocyanins, resveratrol; all from natural origin.

Fructans and fructooligosaccharides (FOS) are naturally occurring storage carbohydrates present in numerous plant. They are defined as polydisperse either linear or branched chain carbohydrates with a degree of polymerisation (DP) ranging from 3 to 60. The low-molecular weight fractions (DP 3 to 20) are commonly known as FOS or oligofructose.  
10 Their molecular major structure  $G_n$  (where G = glucose, F = fructose, n = number of monosaccharides) is represented by n D-fructofuranosyl units ( $F_n$ ) linked by  $\beta(2 \rightarrow 1)$  bonds. Fructans and fructooligosaccharides are nondigestible carbohydrates of the non-glucan type which, because of the configuration of their osidic bonds  $\beta(2 \rightarrow 1)$ , resist hydrolysis by salivary and intestinal digestive enzymes. On the basis of their  
15 nondigestibility, they can be considered in the same way as dietary fiber components.

In food science the interest in dietary fibers has been increasing because of its potential health implications. The term "fiber" refers generally to the bulky part of food that can not be broken down by enzymes in the small intestine, consisting of cellulose, pectine and other materials. The important physiological effects of fiber are related to this  
20 characteristics, as well as to water and ion-binding capacity, viscosity and the products of their fermentation in bowel. The implication is that fiber increases bulk, dilutes colonic contents, speed transit time and changes bacterial metabolism, possibly providing protection from some diseases of the gut. Dietary fiber can alter lipid metabolism by interfering with cholesterol absorption, changing lipoprotein lipase activity or fatty acid

metabolism. Furthermore, dietary fiber has been seen to lower blood glucose levels and influence carbohydrate metabolism. It is well known that a diet high in fiber is beneficial for a variety of reasons. Dietary fiber aids digestion because it provides an indigestible biomass which is carried through the alimentary canal causing undigested food to be pushed out before it. Dietary fiber also clears out bacteria and insures the proper working of the peristaltic muscle. A diet high in fiber has been shown to reduce serum cholesterol and triglyceride levels and has been linked to lower rates of intestinal and colon cancer. Fructans and fructooligosaccharides can be defined as a soluble fiber and are commonly used as a source of fiber. They are also typical "prebiotics". Besides their bifidogenic effect, fructans and fructooligosaccharides have additional nutrition properties on digestive physiological parameters like colonic pH and stool bulking which justify their classification as dietary fibers.

The aim of the present invention is to provide functional food preparations that can be used as ingredient in food compositions or as nutraceuticals which contain fructans (and/or fructooligosaccharides) and phytochemicals (plant polyphenols), such as flavonoids (hesperidin, naringin and hesperetin), anthocyanins (particularly cyanidin-3-glucoside) and resveratrol (trans-3,4',5-trihydroxystilbene).

Flavonoids are a class of naturally occurring and structurally related compounds found widely distributed in plant and plant food. Although flavonoids are considered to be non-nutrition agents, there is an increasing interest in these substances because of possible effects on human health. Flavonoids have a variety of biological effects, such as antioxidants, antiviral, anti-allergic and anti-carcinogenic effects. There is convincing epidemiologic evidence that consumption of fruit and vegetable containing flavonoids contribute to the prevention of degenerative processes, particularly lowering incidence

and mortality rate of cancer and cardio- and cerebrovascular diseases. These compounds may act as antioxidant or as agents of other mechanisms contributing to an anticarcinogenic or cardioprotective action. All citrus fruits are characterised by substantial accumulation of flavonoids whose utilisation is of increasing interest. Hesperidin, the most abundant flavanone glucoside of orange peel, is known to increase capillary resistance in various conditions.

Anthocyanins belong to the flavonoid-type of phenolic molecules. Similarly as the other flavonoids, anthocyanins have been shown to have some positive therapeutic effects, including the maintaining normal vascular permeability and fragility, preventing cholesterol induced arteriosclerosis. They are the most important group of water soluble plant pigments visible to the human eye and they are largely responsible for the colours of flower petals and fruits. Particularly, the presence of anthocyanins is typical of blood orange varieties (Sanguinello, Moro and Tarocco varieties).

Resveratrol is one of the phenolic compounds present in wine (mainly in red wine), that could be responsible for the decrease in coronary heart disease observed among wine drinkers. This potential effect could be due to the ability of resveratrol to inhibit low-density lipoproteins (LDL) oxidation. The cis isomer of resveratrol has anticancer activity, as do the trans isomers by inhibiting protein-tyrosine kinase and cis-resveratrol also shows anti-aggregation properties.

The purpose of this invention is to provide functional food preparation combining the beneficial effects of fructans and/or fructooligosaccharides and biophenols (the above-mentioned flavonoids, anthocyanins, resveratrol).

Another aim of the present invention is to provide preparations which are easy to use as food supplements, mixed in various foodstuff or drinks. Thus, the preparations of the

invention are characterised by being a mixture of components which are co-spray dried using fructans or fructooligosaccharides instead of maltodextrin as a drying agent.

Furthermore, functional food preparation obtained by spray-dry technique, using fructans of inuline-type, are particularly suitable to form a gel or creme, showing a fat-like texture.

5 Another aim of the present invention is to provide functional food products which can be prepared using the above mentioned ingredients adding one or more metals such as calcium, magnesium, iron, selenium. Furthermore, the same functional food products can be added with beta-glucans, which combining the beneficial effects of the above-mentioned ingredients.

10 Typical functional food product of the present invention will become apparent in the description that follows:

Fructans and or fructooligosaccharides from 10 to 90%, polyphenols (naringine, hesperidine, hesperetine, cyanidins, trans-resveratrol) from 0.1 to 80%.

Can be used as fructans commercial products of the inulin type extracted from chicory ,  
15 as well as fructooligosaccharide which is produced enzymatically from beetsugar and consists mainly of GF2, GF3 and GF4. (for instance, actilight of Beghin-Meiji Industries, Neuilly sur Seine, Cedex, France). All functional food products are based mainly on fruit and vegetal ingredients and are obtained using fructans and/or fructooligosaccharides as a carrier employing spray-drying technology. For instance a  
20 granular concentrated of a citrus extract (bergamot, bitter orange or blood orange varieties) wherein inulin from chicory is used as a carrier for citrus extract which are co-spray dried without the use of maltodextrin as a drying agent. It is obvious to those skilled in the art that the embodiments of the invention are not confined to the examples given above, but may vary within the scope of the accompanying claims.

**What is claimed is:**

- 1-Functional food product composition comprising A. Linear fructans, branched fructans and/or fructooligosaccharides from 10 to 90% by weight on the dry matter of said ingredient; B, polyphenols (naringine, hesperidine, hesperetin, anthocyanins, resveratrol) from 0.1 to 80% by weight on the dry matter of said ingredients.
- 2- functional food product according to the claim 1, which contains fructans, either of the inuline type, or fructooligosaccharides and flavonoids (naringine, hesperitin, hesperedin, anthocyanins and resveratrol) in all possible combinations.
- 3- functional food product according to the claim 1, where the flavonoid is naringine.
- 4- functional food product according to the claim 1, where the flavonoid is hesperetin.
- 5- functional food product according to the claim 1, where the flavonoid is hesperidin
- 6- functional food product according to the claim 1, where the flavonoid is the anthocyanins cyanidins-3glucoside
- 7- functional food product according to the claim 1, which contains hesperidin, hesperetin, naringine, and cyanidins-3glucoside
- 8- functional food product according to the claim 1, which contains resveratrol (trans-3, 4', 5,-trihydroxystilbene.
- 9- functional food product according to the claim 1 which contains calcium (as lactate, gluconate, as ascorbate), from 0,5 to 25% by weight on dry matter of said ingredient
- 10- functional food product according to any of the claims 1 to 9 characterised in that the drying consists of spray-dry tecnology.
- 11- functional food product according to any of the claims 1 to 10 characterised in that it contains calcium obtained from vegetal extracts at the minimum level greater them 10%

by weight on dry matter of the said ingredient.

12- functional food product according to any of the claims 1 to 11 characterised in that it contains in that it contains vitamin D3.

13- functional food product according to any of the claims 1 to 12 which contains  
5 calcium and magnesium compounds at the minimum level greater than 01% by weight on dry matter of the said ingredient.

14- functional food product according to any of the claims 1 to 13 which contains iron compounds at the minimum level greater than 0,1% by weight on dry matter of the said ingredient.

10 15- functional food product according to any of the claims 14 which contains selenium at the minimum level greater than 0,1% by weight on dry matter of the said ingredient.

16- functional food product according to any of the claims 1 to 15 which contains beta-glucans, which are co-spry dried from 0,5% to 50% by weight on dry matter of the said ingredient.

15 17- functional food product according to any of the claims 1 to 16 characterised in that it is addet characterised.

18 – Functional food product according to to any of the claims 1 to 17, which is co-spray dried either with a bilberry juice or with a bilberry extract.



# INTERNATIONAL SEARCH REPORT

International Application No

PCT/IT 00/00163

## A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 A23L1/30

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 A23L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, FSTA, WPI Data, PAJ, CHEM ABS Data

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 19 60 592 A (RADEMANNS NÄHRMITTEL) 27 August 1970 (1970-08-27) example 4	1,2,5
X	WO 99 07239 A (ORIOLA OY ;BORAGO AB OY (FI); KAURALA MARITA (FI); MAEKELAE HELENA) 18 February 1999 (1999-02-18) claims	1,2
X	EP 0 420 729 A (ARDEVAL LAB) 3-April 1991 (1991-04-03) claims 1,11-14; example 1	1,2,10, 13
A	WO 96 03150 A (UNIV MONTANA) 8 February 1996 (1996-02-08) page 6, line 30 -page 7, line 3 page 7, line 22 - line 30; claims 1-6	1-3
	-/--	

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

\* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search

24 August 2000

Date of mailing of the international search report

04/09/2000

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2  
NL - 2280 HV Rijswijk  
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,  
Fax: (+31-70) 340-3016

Authorized officer

Lepretre, F

# INTERNATIONAL SEARCH REPORT

International Application No

PCT/IT 00/00163

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	<p>EP 0 861 852 A (TIENSE SUIKERRAFFINADERIJ N V) 2 September 1998 (1998-09-02)</p> <p>-----</p>	

# INTERNATIONAL SEARCH REPORT

...formation on patent family members

Inter national Application No

PCT/IT 00/00163

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
DE 1960592	A	27-08-1970	AT 289528 B	15-02-1971
WO 9907239	A	18-02-1999	FI 973108 A	26-01-1999
			AU 8543698 A	01-03-1999
			EP 0998206 A	10-05-2000
			NO 20000267 A	23-03-2000
EP 0420729	A	03-04-1991	FR 2652265 A	29-03-1991
			AT 88638 T	15-05-1993
			DE 69001471 D	03-06-1993
			DE 69001471 T	09-09-1993
			DE 420729 T	14-08-1991
			ES 2038115 T	16-10-1994
WO 9603150	A	08-02-1996	EP 0797451 A	01-10-1997
			US 6087092 A	11-07-2000
			US 5614501 A	25-03-1997
EP 0861852	A	02-09-1998	WO 9838223 A	03-09-1998
			AU 720549 B	01-06-2000
			AU 5742998 A	18-09-1998
			EP 0963379 A	15-12-1999
			PL 335363 A	25-04-2000

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization  
International Bureau



(43) International Publication Date  
2 November 2000 (02.11.2000)

PCT

(10) International Publication Number  
**WO 00/64282 A1**

(51) International Patent Classification<sup>7</sup>: A23L 1/30

(21) International Application Number: PCT/IT00/00163

(22) International Filing Date: 27 April 2000 (27.04.2000)

(25) Filing Language: Italian

(26) Publication Language: English

(30) Priority Data:  
RM99A000260 27 April 1999 (27.04.1999) IT  
RM99A000646 21 October 1999 (21.10.1999) IT

(71) Applicants and

(72) Inventors: TORTORA, Diomede, Antonio [IT/IT]; Via Acicastello, 32, I-95126 Catania (IT). CORRADINI, Claudio [IT/IT]; Via S. Giovanna Elisabetta, 24, I-00189 Roma (IT). DUGO, Giovanni [IT/IT]; Via Lago di Ganzirri, I-90100 Ganzirri (IT).

DM, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.

(84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

**Published:**

- With international search report.
- With amended claims.

Date of publication of the amended claims: 25 January 2001

*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

(81) Designated States (*national*): AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK,



WO 00/64282 A1

(54) Title: NUTRACEUTICALS AND INGREDIENTS FOR FUNCTIONAL FOODS

(57) Abstract: The present invention provides functional food products which can be used as nutraceuticals as well as ingredients for functionalised foods. All the proposed formulations provide nutraceuticals and food products comprising ingredients such as flavonoids, antocyanins, resveratrol, all from natural origin, which are co-spray dried using fructans or fructooligosaccharides instead of maltodextrins as a drying agent. Furthermore, the proposed functional food preparations obtained by spray-dry technique, using fructans of inuline-type, are particularly suitable to form a gel or cream, showing a fat-like texture.

**AMENDED CLAIMS**

[received by the International Bureau on 31 October 2000 (31.10.00);  
original claims 1-18 replaced by amended claims 1-14 (3 pages)]

1 – Nutraceuticals and functional food compositions comprising linear and or branched high molecular weight fructans (ingredient A), which are co-spray dried with concentrated fruit juices from blood orange varieties (Sanguinella, Moro, Tarocco varieties), containing  
15 cyanidin-3-glucoside (ingredient B). Ingredient A is co-spray dried with ingredient B to obtain homogeneous finely divided powders, which can be used either as nutraceuticals or as ingredients of functional foods. Ingredient A can be varied from 10 to 90% by weight on the dry matter of the said ingredient. Ingredient B, which contain approximately cyanidin-3-glucoside from 0.01 to 10%, can be varied from 10 to 80% by weight, by weight on the dry  
20 matter of the said ingredient

2 - Nutraceuticals and functional food products according to the claims 1, which contain as ingredient B naringin, hesperetin, cyanidin-3-glucoside and trans-3,4',5-trihydroxystilbene (trans-resveratrol) in all possible combinations.

25

3 - Nutraceutical and functional food products according to the claim 1, characterized in that ingredient B is a citrus extract from bergamot, bitter orange or grapefruit, which contain approximately naringin from 0.5 to 100% by weight on the dry matter of the said ingredient.

5 4 - Nutraceutical and functional food products according to the claim 1, characterized in that ingredient B is hesperetin.

5- Nutraceuticals and functional food products according to the claim 1, where the flavonoid is the anthocyanins cyanidins-3glucoside.

10

6- Nutraceuticals and functional food products according to the claim 1, which contain as ingredient B trans-3,4',5-trihydroxystilbene (trans-resveratrol).

7- Nutraceuticals and functional food products according to any of the claim 1 and 2, which  
15 contain calcium (as lactate, gluconate, or ascorbate), from 0,5 to 25% by weight on dry matter of said ingredient

8- Nutraceuticals and functional food products according to any of the claims 1 to 7  
characterised in that it contains calcium obtained from vegetal extracts at the minimum level  
20 greater them 10% by weight on dry matter of the said ingredient.

9- Nutraceuticals and functional food products according to any of the claims 1 to 8  
characterised in that it contains in that it contains vitamin D3.

10- Nutraceuticals and functional food products according to any of the claims 1 to 9, which contains iron compounds at the minimum level greater than 0,1% by weight on dry matter of the said ingredient.

5 11- Nutraceuticals and functional food products according to any of the claims 1 to 10 which contains selenium at the minimum level greater than 0,1% by weight on dry matter of the said ingredient.

10 12- Nutraceuticals and functional food products according to any of the claims 1 to 11 which contains beta-glucans, which are co-spry dried from 0,5% to 50% by weight on dry matter of the said ingredient.

13 – Nutraceuticals and functional food products according to any of the claims 1 to 12, which is co-spray dried either with a bilberry juice or with a bilberry extract

15 14 – Nutraceuticals and functional food products according to any of the claims 1 to 13, which contain both fructans of the inuline-type and fructooligosaccharides having a density (loose) between 0.37 g/mL and 0.85 g/mL.

**This Page is Inserted by IFW Indexing and Scanning  
Operations and is not part of the Official Record**

## **BEST AVAILABLE IMAGES**

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

- ☒ **BLACK BORDERS**
- ☐ **IMAGE CUT OFF AT TOP, BOTTOM OR SIDES**
- ☐ **FADED TEXT OR DRAWING**
- ☒ **BLURRED OR ILLEGIBLE TEXT OR DRAWING**
- ☐ **SKEWED/SLANTED IMAGES**
- ☐ **COLOR OR BLACK AND WHITE PHOTOGRAPHS**
- ☐ **GRAY SCALE DOCUMENTS**
- ☐ **LINES OR MARKS ON ORIGINAL DOCUMENT**
- ☒ **REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY**
- ☐ **OTHER:** \_\_\_\_\_

**IMAGES ARE BEST AVAILABLE COPY.**

**As rescanning these documents will not correct the image problems checked, please do not report these problems to the IFW Image Problem Mailbox.**